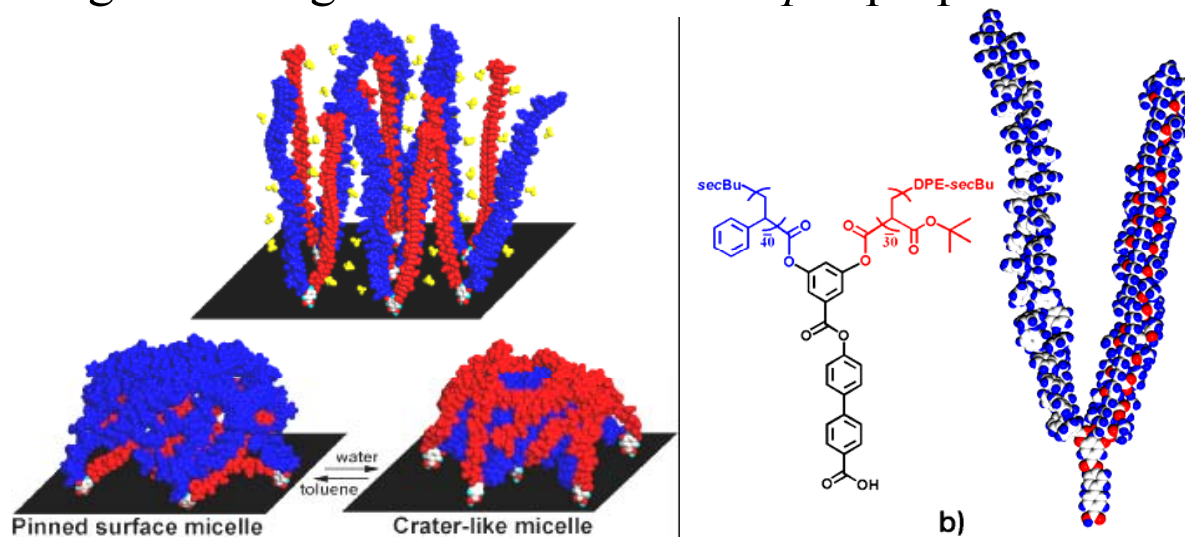


Major Research Accomplishment, 2002-2003

The PI demonstrated that spatial constraints imposed by chemical junctions of two dissimilar (hydrophobic and hydrophilic) polymer chains in Y-shaped branched molecules cause the formation of a novel type of switchable nanostructures in brush layers chemically grafted to the silicon surface. The formation of such surface features is caused by chemical junctions of dissimilar arms to *a single grafting point*. We proposed a model of nano-segregated micelles featuring different states of PS and PAA arms capable of structural reorganization in selective solvents facilitating switching of surface *macroscopic* properties such as wettability by changes of *nanoscale morphology*.

Langmuir, **2003**, 19, 7832
J. Am. Chem. Soc., accepted

Highlighted in
Science, **2003**, 301, 1159



Stimuli-responsive amphiphilic Y-shaped brush with dissimilar arms attached to a single grafting point (right): switching of surface nanostructures upon treatment with selective solvents (left).

DMR-0308982, Assembling dendritic and branched molecules at interfaces

Vladimir Tsukruk, Iowa State University

Impact, 2002-2003

•Educational impact:

K. Genson, received **NSF summer Asian internship** and worked at Kyushu University, Japan

D. Julthongpiput *graduated* in summer 2003 and received All-University **Research Excellence Award** for the best PhD work in Materials Science & Engineering Department in 2003. She received NIST post-doctoral fellowship to continue her research at Polymer Division, NIST.

J. Holzmüller, received **SURF summer undergraduate internship** for summer 2003 work at NIST

•Collaboration with research labs in USA, Germany, Ukraine, Japan, and Korea:

materials supplied by: D. McGrath (U. Arizona), M. Lee (Yonsei U., Korea), V. Shevchenko (National Acad. Sci., Ukraine), E. Zubarev (ISU)

characterization: D. Vaknin (Ames Nat. Lab and Adv. Photon Source), M. Stamm (Inst. Polymer Research, Dresden), A. Takahara (Kyushu U)

- **Outreach:** PI's students delivered **six presentations** (two oral and four posters) at ACS National Meetings and two female high-school students participated in summer research in the PI lab within **Program for Women in Science and Engineering**
The PI won DOE award for beamtime at Advanced Photon Source, ANL